Elevated PGE Concentrations in Roadside Dirt

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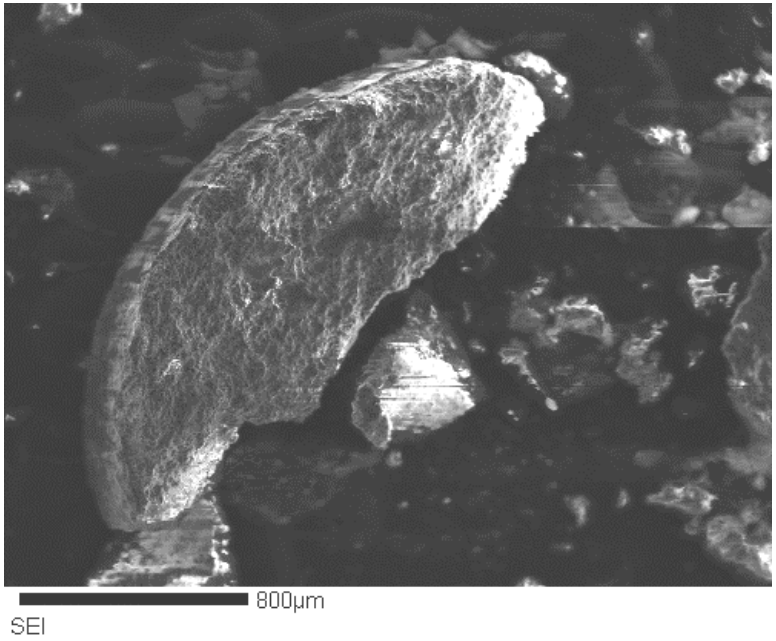
Automobile catalytic converters reduce smog-producing emissions, but are distributing the platinum-group elements (PGEs) Pt, Rh, and Pd throughout the roadside environment. The environmental effects if these PGEs is largely unknown, although platinum is an allergen and if oxidized, it is a potential carcinogen. The PGEs are dispersed as particles from automobile tail pipes as the catalytic converter is attrited. These particles can be found up to 50 meters from the roadside. Research thus far suggests that the large surface area of these particles facilitates PGE oxidation and removal. Further research is in progress to determine the bioavailability of PGEs and their presence in food crops.



A catalytic converter particle, the likely source of roadside PGEs found in this study.

Np(V) Incorporation into Uranyl Mineral Phases

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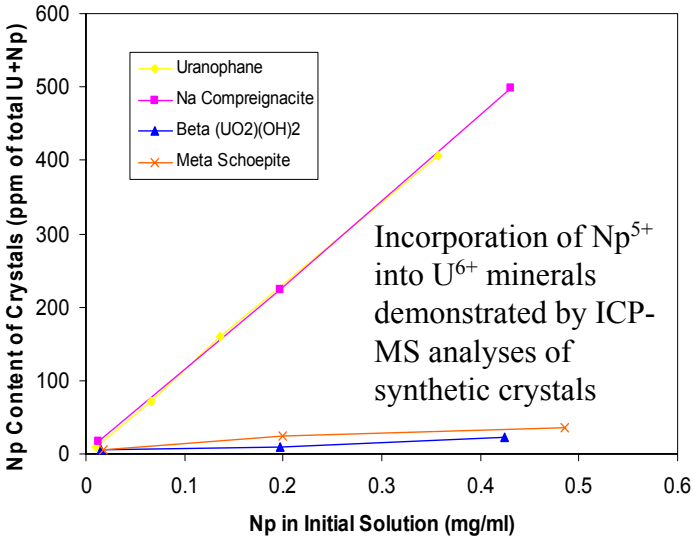
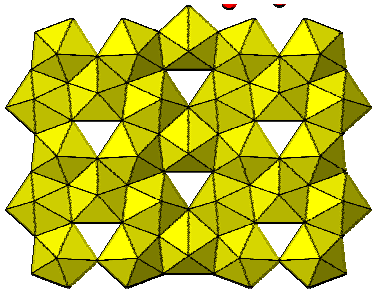
We have demonstrated the incorporation of ppm-levels of Np^{5+} in the structures of uranyl minerals that are expected to form in the vadose zone and by alteration of nuclear waste in a geological repository. This research establishes that uranyl minerals are likely to impact the mobility of Np^{5+} under a wide range of environmental conditions.



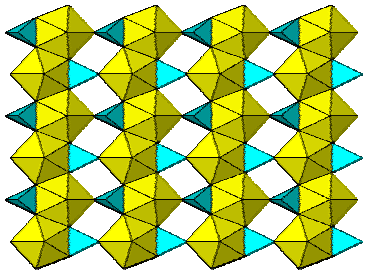
Na-compreignacite

$Na_2[(UO_2)_3O_2(OH)_3]_2(H_2O)_7$

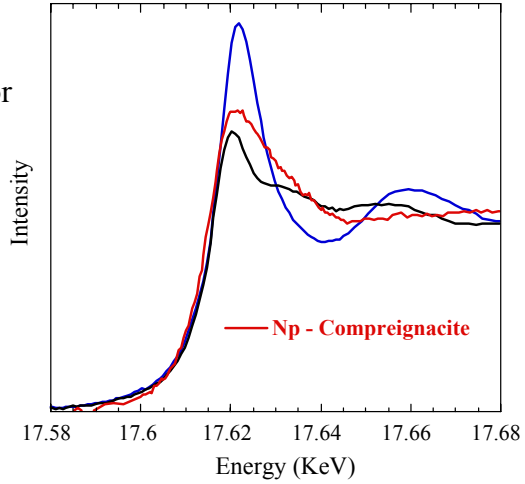


Uranophane

$Ca[(UO_2)(SiO_3OH)]_2(H_2O)_5$



XANES spectra for Np-bearing Na-compreignacite demonstrating incorporation of Np^{5+}



Effects of Cu^{2+}–NOM Complexation on Coagulation in Drinking Water Treatment

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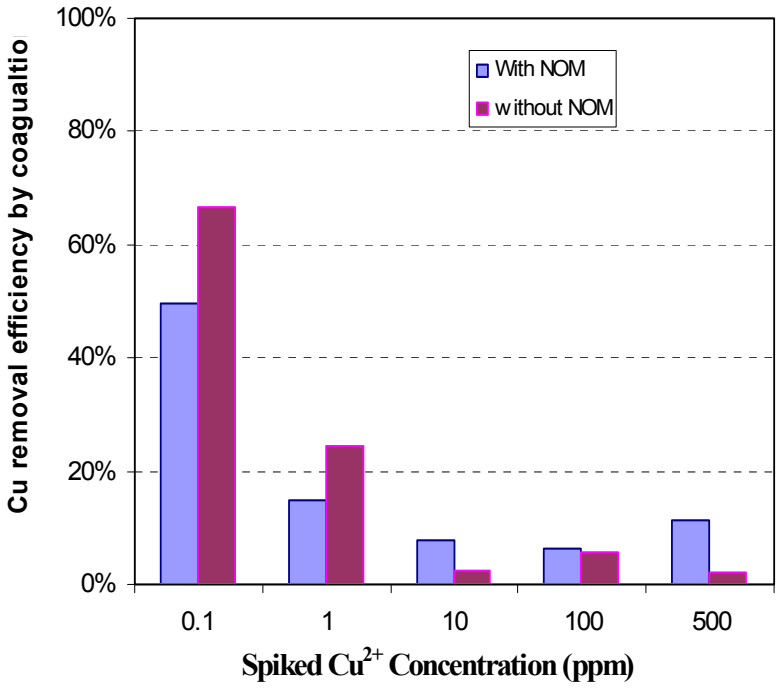
Ground water is one of the most important fresh water sources in US. The presence of natural organic matter (NOM) in ground water may cause color, taste and disinfection by-products in drinking water. Coagulation is considered one of the most effective approaches to reduce NOM. Heavy metals such as copper come into ground water by the contamination of mining and smelting industry. Cu^{2+} may complex with NOM and co-precipitate with coagulant. The presence of Cu^{2+} in ground water can thus pose a new factor for NOM coagulation. The objective of this study is to investigate the effects of Cu^{2+}-NOM complexation on drinking water coagulation. We find that no significant change on TOC removal efficiency was observed due to the addition of 0.1-500 mg/L $CuCl_2$ as Cu^{2+}, but the presence of NOM seems to affect the Cu^{2+} removal efficiency by coagulation dramatically.



Comparison of Cu^{2+} removal efficiency by coagulation with or without the presence of NOM.